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EXAMINER	
LENNOX, NATALIE	
ART UNIT	**PAPER NUMBER**
2609	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/23/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/636,176	Applicant(s) HUANG ET AL.	
	Examiner Natalie Lennox	Art Unit 2609	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 August 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 August 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *See Continuation Sheet*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :4/22/04, 7/16/04, 4/11/05, 6/6/05, 3/17/06, 5/2/06, 7/27/06, 9/11/06, 12/8/06.

DETAILED ACTION

The preliminary amendment filed on August 7, 2003 does not contain the Patent Application Number of the parent application for the CIP.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 2, 3, 6, 10, 11, 34, 35, and 41 are rejected under 35 U.S.C. 102(b) as being anticipated by Marshall (United States Statutory Invention Registration H1497).

As per claim 1, Marshall teaches a headset, comprising:

a head mount (headset 100 in Fig. 1 with head mount, also Fig. 3); and

an audio microphone mechanically connected to the head mount (microphone 104 in Fig. 1, also present in Fig. 3); and

a transducer, configured to generate an electrical signal based on an input indicative of speech, connected to the head mount (photodetectors and/or thermal detectors 102 in Figs. 1 and

3, also Col. 3, lines 48-51, *energy transducers provide electrical signals to an analog signal processing apparatus).*

As per claim 2, Marshall teaches the headset of claim 1 and further comprising:

at least one earphone mechanically connected to the head mount (Figs. 1 and 3 display two headsets each with two earphones).

As per claim 3, Marshall teaches the headset of claim 1, wherein the transducer comprises an infrared sensor (infrared detector or thermal sensor 202 in Fig. 2).

As per claim 6, Marshall teaches the headset of claim 1, wherein the transducer comprises a temperature sensor (infrared detector or thermal sensor 202 in Fig. 2).

As per claim 10, Marshall teaches the headset of claim 1, wherein the transducer is rigidly connected to the head mount (photodetectors and/or thermal detectors 102 in Figs. 1 and 3 as shown connected to the head mount).

As per claim 11, Marshall teaches the headset of claim 10, wherein the audio microphone is rigidly connected to the head mount (microphone 104 in Figs. 1 and 3 as shown connected to the head mount).

As per claim 34, Marshall teaches an audio input system, comprising:

a headset including an audio microphone, and a sensor configured to sense movement of a user's face and output a sensor signal indicative of the movement (headset 100, microphone 104, and photodetectors and/or thermal detectors 102 in Fig. 1, also Col. 2, lines 32-36, *provides a tongue, lip and mouth movement speech information signal that is based on information collected with an integrated motion responsive signal form a photodiode or thermal sensor transducer device*).

As per claim 35, Marshall teaches the audio input system of claim 34, wherein the audio microphone is configured to output a microphone signal based on a received audio input (Col. 2, lines 23-26, *information obtained from the microphone is used primarily to display "acoustical" data about the subject,* also Col. 3, lines 52-54, *analog signal apparatus 106 prepares the photo, infrared, and audio signals to be digitized by the analog-to-digital converter board*, signal apparatus 106 appears in both Fig. 1 and Fig. 2, where the audio signal outputted from microphone 104 enters component 106).

As per claim 41, Marshall teaches an audio input system, comprising:

a headset including an audio microphone, and a sensor configured to sense a physical characteristic of a user indicative of the user speaking or being about to speak (headset 100, microphone 104, and photodetectors and/or thermal detectors 102 in Fig. 1, also Col. 2, lines 26-28, *the photo and infrared information is used to display "mouth/lips/tongue/motor" information about the* subject).

3. Claims 12, 13, 14, 15, 21, 22, 23, 29, 30, 31, and 32 are rejected under 35 U.S.C. 102(b) as being anticipated by Holzrichter (US Patent 6,006,175).

As per claim 12, Holzrichter teaches a speech detection system, comprising:

an audio microphone outputting a microphone signal based on an audio input (microphone 70 in Fig. 19, also Col. 31, lines 15-17, *acoustic information from microphone is inputted into an acoustic speech sensor*);

a speech sensor configured to sense movement of a user's face and output a sensor signal indicative of the movement (tongue 21 and jaw 22 motion EM sensors in Fig. 4., also Col. 32, lines 31-35); and

a speech detector component configured to receive the sensor signal and output a speech detection signal indicative of whether the user is speaking based on the sensor signal (Col. 26, lines 34-38, where combiner 67 in Fig. 12 contains *algorithmic decision tree joining one nonacoustic speech recognition (NASR) and one conventional acoustic speech recognition (CASR) algorithm*; also Col. 25 line 63 to Col. 26 line 16 describes the process signals undergo until formed into feature vectors 61 from NASR and 65 from CASR (in Fig. 12), and further processed and combined to determine if speech is present in order to apply a speech recognition algorithm).

As per claim 13, Holzrichter teaches the speech detection system of claim 12 wherein the speech detector component is configured to receive the microphone signal and provide the speech detection signal based on the sensor signal and the microphone signal (Col. 26, lines 34-38, where combiner 67 in Fig. 12 contains *algorithmic decision tree joining one nonacoustic speech recognition (NASR) and one conventional acoustic speech recognition (CASR) algorithm*; also Col. 25 line 63 to Col. 26 line 16 describes the process signals undergo until formed into feature vectors 61 from NASR and 65 from CASR (in Fig. 12), and further processed and combined to determine speech recognition).

As per claim 14, Holzrichter teaches the speech detection system of claim 12 wherein the speech sensor comprises a radiation sensor configured to sense radiation reflected from the user's face (Col. 49, lines 6-8, the *EM wave acoustic microphones detect acoustic vibrations of*

human tissue, using EM wave sensors; also Col. 49, lines 15-22, *EM wave generating, transmitting and detecting system, including infrared or visible wave radar that can penetrate the first surface of the skin, as well as reflect from the first skin-air surface [...] this includes their use in radiating modes*).

As per claim 15, Holzrichter teaches the speech detection system of claim 14 wherein the radiation sensor comprises an infrared sensor (Col. 49, lines 59-65, *use EM radiation, including visible and IR* (infrared) *spectral information*15-22, *EM wave system including [...] infrared or visible wave radar that can penetrate the first surface of the skin, as well as reflect from the first skin-air surface [...] this includes their use in radiating modes*).

As per claim 21, Holzrichter teaches a method of detecting whether a user is speaking, comprising:

providing a sensor signal indicative of sensed radiation reflected from the user's face (Col. 48, lines 44-48, *method of speech characterization that uses electromagnetic (EM) radiation scattered (i.e., reflected and/or attenuated) from human speech organs in concert with acoustic speech output for the purpose of speech recognition*, also antenna 53 in Fig. 12 receives the sensor signal); and

detecting whether the user is speaking based on the sensor signal (Col. 49, lines 30-34, where *information on the positions and presence or absence of speech organ interfaces is provided by measuring the time between transmitted and received EM signals*).

As per claim 22, Holzrichter teaches the method of claim 21, wherein providing a sensor signal comprises:

directing infrared radiation on the user's face (Col. 49, lines 15-19, *the use of EM wave generating, transmitting and detecting system, including [...] infrared or visible wave radar that can [...] reflect from the first skin-air surface*); and

detecting infrared radiation reflecting from the user's face Col. 49, lines 15-19, *the use of EM wave generating, transmitting and detecting system, including [...] infrared or visible wave radar that can [...] reflect from the first skin-air surface*).

As per claim 23, Holzrichter teaches the method of claim 22, wherein providing a sensor signal comprises:

generating the sensor signal as a radiation detection signal indicative of a measure of the detected infrared radiation (Col. 49, lines 15-19, *the use of EM wave generating, transmitting and detecting system, including [...] infrared or visible wave radar that can [...] reflect from the first skin-air surface*, also Col. 49, lines 30-34, where *information on the positions and presence or absence of speech organ interfaces is provided by measuring the time between transmitted and received EM signals*).

As per claim 29, Holzrichter teaches a speech recognition system, comprising:

a speech detector system comprising:

an audio microphone outputting a microphone signal based on an audio input (microphone 70 in Fig. 19, also Col. 31, lines 15-17, *acoustic information from microphone is inputted into an acoustic speech sensor*);

a speech sensor configured to sense movement of a user's face and output a sensor signal indicative of the movement (tongue 21 and jaw 22 motion EM sensors in Fig. 4., also Col. 32, lines 31-35); and

a speech detector component configured to receive the sensor signal and output a speech detection signal indicative of whether the user is speaking based on the sensor signal (Col. 26, lines 34-38, where combiner 67 in Fig. 12 contains *algorithmic decision tree joining one nonacoustic speech recognition (NASR) and one conventional acoustic speech recognition (CASR) algorithm*; also Col. 25 line 63 to Col. 26 line 16 describes the process signals undergo until formed into feature vectors 61 from NASR and 65 from CASR (in Fig. 12), and further processed and combined to determine if speech is present in order to apply a speech recognition algorithm);

a background speech removal component providing a modified speech signal based on the speech detection signal and the microphone signal (processor 66 in Fig. 12, Col. 26, lines 4-7, *processor can include gain setting, speaker normalization, time adjustment, background removal, comparison to data from previous frames, and other well known procedures*); and

a speech recognition engine receiving the modified speech signal and recognizing speech represented by the modified speech signal (speech recognition algorithm 68 in Fig. 12, Col. 26 lines 13-16, *the two feature vectors are further processed and combined and if the result is speech recognition, a speech recognition algorithm 68 is applied*).

As per claim 30, Holzrichter teaches the speech recognition system of claim 29, wherein the speech detector component is configured to receive the microphone signal and provide the speech detection signal based on the sensor signal and the microphone signal (Col. 26, lines 34-38, where combiner 67 in Fig. 12 contains *algorithmic decision tree joining one nonacoustic speech recognition (NASR) and one conventional acoustic speech recognition (CASR) algorithm*; also Col. 25 line 63 to Col. 26 line 16 describes the process signals undergo until formed into

feature vectors 61 from NASR and 65 from CASR (in Fig. 12), and further processed and combined to determine speech recognition).

As per claim 31, Holzrichter teaches the speech recognition system of claim 29, wherein the speech sensor comprises a radiation sensor configured to sense radiation reflected from the user's face (Col. 49, lines 6-8, the *EM wave acoustic microphones detect acoustic vibrations of human tissue, using EM wave sensors*; also Col. 49, lines 15-22, *EM wave generating, transmitting and detecting system, including infrared or visible wave radar that can penetrate the first surface of the skin, as well as reflect from the first skin-air surface [...] this includes their use in radiating modes*).

As per claim 32, Holzrichter teaches the speech recognition system of claim 31, wherein the radiation sensor comprises an infrared sensor (Col. 49, lines 59-65, *use EM radiation, including visible and IR* (infrared) *spectral information*15-22, *EM wave system including [...] infrared or visible wave radar that can penetrate the first surface of the skin, as well as reflect from the first skin-air surface [...] this includes their use in radiating modes*).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 4, 5, 7, 8, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marshall (United States Statutory Invention Registration H1497) as applied to claim 1 above, and further in view of Zucherman et al. (US Patent 5,404,577).

As per claim 4, Marshall teaches the headset of claim 1, but doesn't specifically mention the transducer comprising a throat microphone. Zucherman et al. teach a helmet with a throat microphone (throat microphone 54a in Fig. 14, also Col. 13, lines 50-60). It would have been obvious to one of ordinary skill to use the feature of a throat microphone as taught by Zucherman et al. for Marshall's transducer and headset because Zucherman provides a head-protective helmet with a voice communications system for use by personnel in the fields, for example, firefighting, police, military, industrial and hazardous material handling, wherein the environment or type of work requires enhanced voice communications between such personnel.

As per claim 5, Marshall teaches the headset of claim 1, but doesn't specifically mention the transducer comprising a bone microphone. Zucherman et al. teach a helmet with a bone conduction microphone (bone conduction microphone 54 in Fig. 2, also Col. 6, lines 11-16). It would have been obvious to one of ordinary skill to use the feature of a bone conduction microphone as taught by Zucherman et al. for Marshall's transducer and headset because Zucherman provides a head-protective helmet with a voice communications system for use by personnel in the fields, for example, firefighting, police, military, industrial and hazardous material handling, wherein the environment or type of work requires enhanced voice communications between such personnel.

As per claim 7, Marshall teaches the headset of claim 1, but doesn't specifically mention the transducer to be positioned inside a user's ear. Zucherman et al. teach a head protective

helmet including a speaker positioned inside an ear cup and in voice communication with the ear of the journeyman (speaker 55 in Fig. 2, also Col. 6, lines 26-35). It would have been obvious to one of ordinary skill to use the feature of a speaker adjacent to the ear as taught by Zucherman et al. for Marshall's transducer and headset because Zucherman provides a head-protective helmet with a voice communications system for use by personnel in the fields, for example, firefighting, police, military, industrial and hazardous material handling, wherein the environment or type of work requires enhanced voice communications between such personnel.

As per claim 8, Marshall teaches the headset of claim 1, but doesn't specifically mention the transducer's position to be located in operative contact with a skull or face bone of a user. Zucherman et al. teach a bone conduction microphone placed in conduction or communication with the jawbone of the journeyman (Col. 6, lines 32-35). It would have been obvious to one of ordinary skill to use the feature of a bone conduction microphone in communication with the jawbone of a journeyman or user as taught by Zucherman et al. for Marshall's transducer and headset because Zucherman provides a head-protective helmet with a voice communications system for use by personnel in the fields, for example, firefighting, police, military, industrial and hazardous material handling, wherein the environment or type of work requires enhanced voice communications between such personnel.

As per claim 9, Marshall teaches the headset of claim 1, but doesn't specifically mention the transducer's position to be located in contact with a throat of a user. Zucherman et al. teach a throat microphone located adjacent to the throat of a journeyman (Col. 14, lines 26-28). It would have been obvious to one of ordinary skill to use the feature of a throat microphone located adjacent to the throat of a journeyman or user as taught by Zucherman et al. for Marshall's

transducer and headset because Zucherman provides a head-protective helmet with a voice communications system for use by personnel in the fields, for example, firefighting, police, military, industrial and hazardous material handling, wherein the environment or type of work requires enhanced voice communications between such personnel.

6. Claims 16 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holzrichter (US Patent 6,006,175) as applied to claims 14 and 31 above, and further in view of Bambot et al. (US Patent 6,590,651).

As per claims 16 and 33, Holzrichter teaches the speech detection system of claim 14 and speech recognition system of claim 31, but doesn't specifically mention the radiation sensor comprising a charge coupled device. Bambot et al. teach an electromagnetic radiation sensor that may comprise a charge coupled device. (Col. 6, lines 44-47). It would have been obvious to one of ordinary skill to use the feature of a charge coupled device as an electromagnetic radiation sensor as taught by Bambot et al. for Holzrichter's radiation sensor because Bambot et al. provide a method and apparatus to irradiate a target tissue with electromagnetic radiation and to detect returned electromagnetic radiation to determine a property, condition, or characteristics of the target tissue.

7. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holzrichter (US Patent 6,006,175) as applied to claim 14 above, and further in view of Holzrichter et al. (US 2003/0097254).

As per claim 17, Holzrichter teaches the speech detection system of claim 14, but doesn't specifically mention the speech detector component configured to detect a baseline value of a signal characteristic of the sensor signal. Holzrichter et al. teach a speech segmentation procedure using threshold detection of an electromagnetic (EM) sensor signal to define onset and end of voiced segment timing. (paragraph [0031]). It would have been obvious to one of ordinary skill in the art to have use the feature of threshold detection of an EM sensor signal as taught by Holzrichter et al. for Holzrichter's speech detector component because Holzrichter et al. provides a system for removing "excess" information from a human speech signal by using an EM sensor, a microphone, and their algorithms.

As per claim 18, Holzrichter as modified by Holzrichter et al. teach the speech detection system of claim 17, wherein the speech detection component configured to output the speech detection signal based on a value of the signal characteristic during an observation time period relative to the baseline value (Holzrichter et al. in paragraph [0062], *the onset of speech event can be automatically determined by measuring a signal from the EM sensor that senses movement of a speech organ that reliably signals speech onset. [U]sing the EM sensor signal to measure the beginning of vocal fold movement and sending its signal to a processor* [that] *compares the measured glottal signal to a predetermined threshold level, which if it exceeds a predetermined threshold, defines a voiced speech onset time*; and also in paragraph [0063], *[I]f the EM sensor signal drops below a predetermined threshold signal, averaged over a predetermined time interval, the processor will note this time as an end of voiced speech segment time*).

8. Claims 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Holzrichter (US Patent 6,006,175) as modified by Holzrichter et al. (US 2003/0097254) as applied to claim 18 above, and further in view of May, Jr. (US Patent 4,382,164).

As per claim 19, Holzrichter as modified by Holzrichter et al. teach the speech detection system of claim 18, but they don't specifically mention the speech detector component to be configured to intermittently re-estimate the baseline value of the signal characteristic. May, Jr. teaches a threshold generator which develops dynamically adjustable decision levels for a speech definer in a speech detector. (Col. 4, lines 21-24, also threshold generator 14 in Fig. 1, which is a diagram of a basic speech detector).

It would have been obvious to one having ordinary skill in the art to have used the feature of an adjustable threshold as taught by May, Jr. for the speech detection system as taught by Holzrichter and modified by Holzrichter et al. because May, Jr.'s invention relates to signal detecting arrangements for detecting speech activity in the presence of noise.

9. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Holzrichter (US Patent 6,006,175) as applied to claim 12 above, and further in view of Marshall (United States Statutory Invention Registration H1497).

As per claim 20, Holzrichter teaches the speech detection system of claim 12, but doesn't specifically mention the audio microphone and the speech sensor to be mounted to a headset. Marshall teaches a headset with an audio microphone and photo/thermal detectors (Fig. 1, headset 100, photodetectors and/or thermal detectors 102). It would have been obvious to one having ordinary skill in the art to use the feature of mounting the audio microphone and speech

detectors into a headset as taught by Marshall for Holzrichter's speech detection system because Marshall provides a combination of a photo/thermal detector and microphone for the purpose of conducting speech pronunciation measurements for detecting problems and help identify solutions relating to speech production for verbally challenged individuals in either the speech pathology, speech therapy, language learning, or basic education fields.

10. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Holzrichter (US Patent 6,006,175) as applied to claim 23 above, and further in view of May, Jr. (US Patent 4,382,164).

As per claim 24, Holzrichter teaches the method of claim 23, but doesn't disclose detecting whether the user is speaking comprising of intermittently calculating a baseline sensor signal value. May, Jr. teaches a threshold generator which develops dynamically adjustable decision levels for a speech definer in a speech detector. (Col. 4, lines 21-24, also threshold generator 14 in Fig. 1, which is a diagram of a basic speech detector). It would have been obvious to one having ordinary skill in the art to have used the feature of an adjustable threshold as taught by May, Jr. for the speech detection system as taught by Holzrichter and modified by Holzrichter et al. because May, Jr.'s invention relates to signal detecting arrangements for detecting speech activity in the presence of noise.

11. Claim 25, 26, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holzrichter (US Patent 6,006,175) as modified by May, Jr. (US Patent 4,382,164) as applied to claim 24 above, and further in view of Holzrichter et al. (US 2003/0097254).

As per claim 25, Holzrichter as modified by May, Jr. teach the method of claim 24, but don't specifically mention detecting whether the user is speaking comprising comparing the sensor signal to the baseline sensor signal value. Holzrichter et al. teaches the onset of speech event can be automatically determined by measuring a signal from the EM sensor that senses movement of a speech organ that reliably signals speech onset. Using the EM sensor signal to measure the beginning of vocal fold movement and sending its signal to a processor [that] compares the measured glottal signal to a predetermined threshold level, which if it exceeds a predetermined threshold, defines a voiced speech onset time. If the EM sensor signal drops below a predetermined threshold signal, averaged over a predetermined time interval, the processor will note this time as an end of voiced speech segment time (paragraphs [0062] and [0063]). It would have been obvious to one of ordinary skill in the art to have use the feature of threshold detection of an EM sensor signal as taught by Holzrichter et al. for Holzrichter's speech detector component because Holzrichter et al. provides a system for removing "excess" information from a human speech signal by using an EM sensor, a microphone, and their algorithms.

As per claim 26, Holzrichter as modified by May, Jr. and in further view of Holzrichter et al. teach the method of claim 25, further comprising:

providing a microphone signal indicative of a sensed audio speech signal (Holzrichter's Col. 17, lines 24-27, *in Fig. 3, signals from acoustic microphone 1, and three EM sensors for vocal folds are combined using vocal tract model 5 to form a vocal tract feature vector 6*).

As per claim 27, Holzrichter as modified by May, Jr. and in further view of Holzrichter et al. teach the method of claim 26, wherein detecting whether the user is speaking comprises:

detecting whether the user is speaking based on the sensor signal and the microphone signal (Holzrichter's Col. 26, lines 34-38, where combiner 67 in Fig. 12 contains *algorithmic decision tree joining one nonacoustic speech recognition (NASR) and one conventional acoustic speech recognition (CASR) algorithm*; also Col. 25 line 63 to Col. 26 line 16 describes the process signals undergo until formed into feature vectors 61 from NASR and 65 from CASR (in Fig. 12), and further processed and combined to determine speech recognition).

12. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Holzrichter (US Patent 6,006,175) as applied to claim 21 above, and further in view of Nakamura (US Patent 4,769,845).

As per claim 28, Holzrichter teaches the method of claim 21, but doesn't disclose providing a sensor signal comprising of sensing an image of the user's face and providing the sensor signal as an image signal indicative of the sensed image. Nakamura teaches an image pickup apparatus that picks up the image of the shape of a persons lip during speech as an optical image, and converts this optical image in a conventional manner into an electrical television image signal (Col. 2, lines 55-58). It would have been obvious to one having ordinary skill in the art to use the feature of an image pickup apparatus as taught by Nakamura for the method of detecting whether a user is speaking as taught by Holzrichter because Nakamura provides a method of recognizing speech from a lip image.

13. Claims 36, 37, 38, 39, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marshall (United States Statutory Invention Registration H1497) as applied to claim 34 above, and further in view of Holzrichter (US Patent 6,006,175).

As per claim 36, Marshall teaches the audio input system of claim 34, but doesn't disclose the system further comprising a speech detector component configured to receive the sensor signal and output a speech detection signal indicative of whether the user is speaking or is about to speak, based on the sensor signal. Holzrichter teaches
a combiner that contains an algorithmic decision tree joining one non-acoustic speech recognition (NASR) and one conventional acoustic speech recognition (CASR) algorithm, that after receiving the sensor and audio signals from the processor, combines them to determine if speech is present (combiner 67 in Fig. 12, also Col. 26, lines 34-38 and Col. 25 line 63 to Col. 26 line 16). It would have been obvious to one having ordinary skill in the art to use the feature of a combiner as taught by Holzrichter for Marshall's audio input system because Holzrichter provides the use of non-acoustic information in combination with acoustic information for speech recognition and related speech technologies.

As per claim 37, Marshall teaches a speech recognition system that comprises a headset including an audio microphone outputting a microphone signal based on an audio input, and a speech sensor configured to sense a physical characteristic indicative of speech and output a sensor signal indicative of the sensed physical characteristic (headset 100, microphone 104, photodetectors and/or thermal detectors 102, and signal apparatus 106 in Fig. 1, where the audio signal outputted from microphone 104 enters component 106, also Col. 2, lines 26-28, *the photo and infrared information is used to display "mouth/lips/tongue/motor" information about the*

subject), but it is noted that Marshall doesn't disclose a speech recognition engine recognizing speech based on the microphone signal and the sensor signal. Holzrichter teaches a speech recognition algorithm to be applied after determining by a combiner if speech is present (speech recognition algorithm 68, combiner 67, and feature vectors 65 and 61 that represent the microphone and sensor signals, respectively, in Fig. 12, also Col. 26 lines 13-16, *the two feature vectors are further processed and combined and if the result is speech recognition, a speech recognition algorithm 68 is applied*). It would have been obvious to one having ordinary skill in the art to use the feature of a speech recognition algorithm for Marshall's speech recognition system because Holzrichter provides the use of non-acoustic information in combination with acoustic information for speech recognition and related speech technologies.

As per claim 38, Marshall, in view of Holzrichter, teach the speech recognition system of claim 37, further comprising:

a speech detector component configured to receive the sensor signal and output a speech detection signal indicative of whether the user is speaking based on the sensor signal (Holzrichter: Col. 26, lines 34-38, where combiner 67 in Fig. 12 contains *algorithmic decision tree joining one nonacoustic speech recognition (NASR) and one conventional acoustic speech recognition (CASR) algorithm*; also Col. 25 line 63 to Col. 26 line 16 describes the process signals undergo until formed into feature vectors 61 from NASR and 65 from CASR (in Fig. 12), and further processed and combined to determine if speech is present in order to apply a speech recognition algorithm).

As per claim 39, Marshall, in view of Holzrichter, teach the speech recognition system of claim 38, further comprising:

a background speech removal component providing a modified speech signal based on the speech detection signal and the microphone signal (Holzrichter: processor 66 in Fig. 12, Col. 26, lines 4-7, *processor can include gain setting, speaker normalization,.time adjustment, background removal, comparison to data from previous frames, and other well known procedures*).

As per claim 40, Marshall, in view of Holzritcher, teach the speech detection system of claim 39, wherein the speech recognition engine is configured to recognize speech represented by the modified speech signal (Holzrichter: speech recognition algorithm 68 in Fig. 12, Col. 26 lines 13-16, *the two feature vectors are further processed and combined and if the result is speech recognition, a speech recognition algorithm 68 is applied*).

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Burnett et al. (US Patent 6,377,919) provides a system and method for characterizing voiced excitations of speech and acoustic signals, removing acoustic noise from speech, and synthesizing speech.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Natalie Lennox whose telephone number is (571) 270-1649. The examiner can normally be reached on Monday to Friday 7:30 am - 5:00 pm (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Xiao Wu can be reached on (571) 272-7761. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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